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Obstetric anal sphincter injury

G. E. Fowler
Urodynamic Department, Liverpool Women's Hospital, Liverpool, UK

Abstract
Obstetric trauma following childbirth is the primary cause of faecal incontinence in women. Injury to the anal sphincter complex is common: it has been clinically diagnosed in 0.4–2.5% of vaginal deliveries involving a mediolateral episiotomy and in up to 19% of cases of midline episiotomy. Studies using endoanal ultrasound have reported occult anal sphincter injury in up to 35% of women after their first delivery. This paper reviews the risk factors for obstetric anal sphincter injury, as well as diagnosis and management of the condition.

Keywords: anal sphincter, faecal incontinence, obstetrics.

Introduction

Consequences of anal sphincter injury

Childbirth has a significant impact on the physical and psychological well-being of women: up to 91% of women report at least one new symptom 8 weeks after delivery (Glazener *et al.* 1995). Women with recognized anal sphincter injury have increased morbidity compared with those with first- and second-degree tears.

It is recognized that obstetric anal sphincter trauma is the commonest cause of anal incontinence. The International Continence Society defines anal incontinence as 'the involuntary loss of flatus or faeces which becomes a social or hygiene problem'.

Anal incontinence affects 4–6% of women up to 12 months after delivery (MacArthur *et al.* 1997; Chaliha *et al.* 1999; Fernando *et al.* 2002), with 40 000 mothers being affected each year in the UK (Glazener 1997; Glazener *et al.* 1998). In women with a clinically recognized anal sphincter injury, however, symptoms are more common, with faecal incontinence, faecal urgency, dyspareunia and perineal pain reported in 30–50% of women, and these symptoms may persist for many years (Haadem *et al.* 1988; Crawford *et al.* 1993; Sultan *et al.* 1994).

Anal incontinence has been described as the 'unvoiced symptom' because affected individuals avoid seeking medical advice (Leigh & Turnberg 1982). Many do not seek medical attention because of embarrassment and the taboo nature of the problem. Some women are discouraged from discussing their symptoms because they feel that these are a normal consequence of childbirth (Haadem *et al.* 1988; Walsh *et al.* 1996). It is essential that health professionals who look after women ask about symptoms of faecal incontinence, especially in the postpartum period. Sadly, the true incidence of anal incontinence and its impact on women following childbirth is currently unknown.

Classification of obstetric anal sphincter injury

Since 2001, the same accepted classification has been used by the Royal College of Obstetricians and Gynaecologists (RCOG 2001) and the International Consultation on Incontinence (Norton *et al.* 2002).

A third-degree perineal tear is defined as a partial or complete disruption of the anal sphincter muscles, which may involve either or both the external (EAS) and internal anal sphincter (IAS) muscles. Therefore, third-degree tear has been classified as 3A, 3B or 3C in order to standardize classification (Table 1).

A fourth-degree tear is defined as a disruption of the anal sphincter muscles with a breach of the rectal mucosa.

Occult anal sphincter injury

Sultan *et al.* (1993) investigated subjects using endoanal ultrasound, and reported occult anal

Correspondence: Dr Gillian Fowler, Subspecialty Trainee in Urogynaecology, Urodynamic Department, Liverpool Women's Hospital, Crown Street, Liverpool L8 7SS, UK (e-mail: gillian.fowler@lwh.nhs.uk).

Table 1. Classification of perineal trauma: (EAS) external anal sphincter; and (IAS) internal anal sphincter

Type of tear	Definition
First-degree	Injury to the perineal skin
Second-degree	Injury to the perineum involving the perineal muscles, but not involving the anal sphincter
Third-degree	Injury to the perineum involving the anal sphincter complex:
(3A)	<50% of the EAS thickness torn
(3B)	>50% of the EAS thickness torn
(3C)	both the EAS and the IAS torn
Fourth-degree	Injury to the perineum involving the anal sphincter complex (both the EAS and the IAS) and anal epithelium

sphincter injuries in up to 35% of women after their first delivery, suggesting that the vast majority of sphincter injuries are not diagnosed clinically at time of delivery. Since this initial work, many studies using endoanal ultrasound in the postpartum period have reported occult sphincter rates ranging between 6.8% and 28% (Varma *et al.* 1999; Faltin *et al.* 2000).

One study has gone further, questioning whether anal sphincter injuries are truly 'occult' or simply missed clinically at the time of delivery (Andrews *et al.* 2006).

There is no question that the addition of postpartum endoanal ultrasound increases the detection of sphincter injury (Faltin *et al.* 2005; Andrews *et al.* 2006). It is also recognized that symptoms of faecal incontinence following an anal sphincter injury are not commonly reported in the immediate postpartum period, and many patients remain asymptomatic for many years. Therefore, the diagnosis of obstetric anal sphincter damage is often delayed for many years, and the opportunity for early surgical intervention or physiotherapy input is missed.

The importance of early diagnosis has been highlighted in a recent paper (Faltin *et al.* 2000). The results of this randomized controlled trial (RCT) showed a reduction in faecal incontinence symptoms at 12 months in women who had a surgical repair of a sphincter injury diagnosed by endoanal ultrasound at time of delivery in comparison to those who had no repair.

However, there is limited availability of endoanal ultrasound equipment and staff trained in its use, as well as poor patient acceptability of the technique. Consequently, systematic examination of the perineal area by experienced staff following delivery remains the method of detecting sphincter injury in clinical practice, and is advocated by both midwifery and obstetric colleges, while postpartum endoanal ultrasound remains only a research tool at present.

Risk factors for anorectal injury

In order to prevent anorectal injury, it is important to identify the risk factors for the condition. The majority of research assessing risk factors relates to third-degree tears. Based on the overall risk of third-degree tears being 1% of vaginal deliveries, a number of risk factors have been identified by retrospective studies. These include induction of labour (up to 2%), epidural analgesia (up to 2%), birth weight over 4 kg (up to 2%), persistent occipitoposterior position (up to 3%), primiparity (up to 4%), a second stage longer than one hour (up to 4%) and forceps delivery (up to 7%) (RCOG 2001). These risk factors were confirmed by a systematic review of 14 studies (Adams *et al.* 2001). Other risk factors, such as shoulder dystocia, have been suggested, but the evidence is contradictory.

Parity

Some population-based studies of faecal incontinence (FI) have assessed obstetric history. The first vaginal delivery carries the greatest risk of new-onset FI (Zetterstrom *et al.* 1999; Macarthur *et al.* 2001), and each subsequent delivery adds to that risk (Faltin *et al.* 2001).

Episiotomy

There is conflicting evidence in the literature regarding episiotomy. Traditional teaching holds that episiotomy protects the perineum from uncontrolled trauma during delivery. Although several authors have demonstrated a protective effect with mediolateral episiotomy (Anthony *et al.* 1994; Poen *et al.* 1997; de Leeuw *et al.*

2001), others have reported the converse (Bek & Laurberg 1992a; Wood *et al.* 1998; Buchhave *et al.* 1999). The type of episiotomy is important. Evidence suggests that mediolateral episiotomy, which is favoured in UK and European practice, has a significantly lower risk of sphincter injury in comparison with midline episiotomy, which is favoured in the USA, and rates of 2% versus 12% have been reported (Coats *et al.* 1980; Signorello *et al.* 2000). The confusion in the evidence may be explained by variations in clinical practice that are not reflected in the above studies. There will be differences in the experience of the accoucheur for a normal delivery, and the rate of episiotomy also varies. The differences between medical and midwifery staff in conducting a mediolateral episiotomy have been studied, with doctors performing episiotomies that are longer and at a wider angle than those carried out by midwifes (Tincello *et al.* 2003; Andrews *et al.* 2005). Current evidence is unable to support the routine use of episiotomy to prevent anal sphincter injury.

Assisted vaginal delivery

The incidence of anal sphincter damage and faecal incontinence symptoms following instrumental delivery is higher than following normal vaginal delivery (Sultan *et al.* 1993; Donnelly *et al.* 1998; Varma *et al.* 1999). In recent years, vacuum extractor or ventouse has become the favoured instrument for assisted vaginal delivery rather than forceps. This is based on evidence from many studies, including a Cochrane review of 10 trials showing that the use of the vacuum extractor instead of forceps was associated with significantly less maternal trauma [odds ratio (OR) = 0.4; 95% confidence interval (95% CI) = 0.3–0.5] (Johanson & Menon 1999).

However, compared with forceps delivery, vacuum extraction is significantly more likely to fail (OR = 1.7; 95% CI = 1.3–2.2). In addition, the neonatal risks associated with ventouse delivery are greater, with increased risks of cephalohaematoma and retinal haemorrhage (Johanson & Menon 1999; RCOG 2005).

Other risk factors

Studies assessing the risk factors for neuropathy following childbirth have reported injury to be more common in the presence of a prolonged labour, particularly a protracted second stage, and in instances involving a foetus with a large head (Snooks *et al.* 1985; Bannister *et al.* 1987; Sultan *et al.* 1994). Many of these factors may result in the need for an assisted vaginal delivery. Further vaginal delivery may result in further pudendal nerve damage (Kamm 1994).

Many of the risk factors identified above are components of normal vaginal delivery and cannot be avoided. Furthermore, the majority of women with these risk factors deliver without anorectal injury. Attempts to develop an antenatal risk scoring system for sphincter injury have so far been unsuccessful (Williams *et al.* 2005b). Studies are needed to assess the effect of interventions to prevent sphincter injury.

Protection against anal sphincter injury

Increased awareness of the complications of childbirth is fuelling requests by women for elective Caesarean section (CS) in otherwise low-risk pregnancies. Indeed, a survey of female obstetricians in 1996 revealed that 31% would themselves request elective CS because of the potential risk of perineal trauma (Al-Mufti *et al.* 1996). This view contrasts with the recent National Institute for Clinical Excellence guidelines, which report an increased risk of maternal morbidity with CS compared with vaginal delivery (NICE 2004).

Elective CS, as opposed to emergency CS, has been shown to protect against faecal incontinence (Macarthur *et al.* 1997). Studies have shown that CS late in the first stage of labour (>8 cm dilatation) or in the second stage does not protect the function of the anal sphincter (Fynes *et al.* 1998).

Technique and method of repair of obstetric anal sphincter injury

The RCOG has produced national guidelines for the management of anal sphincter injury that are based on the best available evidence (RCOG 2007). Together with a recently published Cochrane systematic review on the method of repair of obstetric anal injury (Fernando *et al.* 2006b), these provide recommendations on each aspect of sphincter repair. The RCOG guidelines can be reviewed online (http://www.rcog.org.uk/resources/Public/pdf/green_top29_management_third_minoramend.pdf), and therefore, only the salient points will be highlighted in the present paper.

Setting of repair

The RCOG recommend that repair of anal sphincter injury takes place in an operating theatre. This provides aseptic conditions and

adequate light. Regional or general anaesthesia enables the sphincter muscle to relax, enabling the retracted torn ends to be retrieved and brought together without tension (Sultan *et al.* 1999).

Antibiotics

Infection following anal sphincter repair is associated with a high risk of anal incontinence and fistula formation (Sultan *et al.* 1999). Intraoperative intravenous and postoperative oral broad spectrum antibiotics have been used in all RCTs assessing different repair techniques.

Typical regimes include cefuroxime 1.5 g and metronidazole 500 mg in theatre, followed by a 7-day course of cephalexin 500 mg and metronidazole 500 mg three times a day (Sultan *et al.* 1999; Fitzpatrick *et al.* 2000; Fernando *et al.* 2006b; Williams *et al.* 2006).

Laxatives

Traditionally, women received constipating agents following sphincter repair. This was based on the experience of colorectal surgeons who were undertaking secondary sphincter repair on patients with faecal incontinence, and was intended to avoid liquid faecal matter contaminating the wound. Primary repair differs from secondary repair since women do not have pre-existing faecal incontinence at time of repair. The use of postoperative laxatives and stool softeners is supported by the opinion that these act to avoid passing a hard stool that could, in turn, disrupt the repair (Sultan *et al.* 1999).

In the published RCTs, stool softeners (lactulose 10 mL three times a day), together with a bulking agent (ispaghula husk, Fybogel, one sachet twice a day) were used for 10 days following repair.

The need for laxatives may be tailored to the individual women; the dose and type will be dependent on a patient's diet, gut transit time and stool consistency.

Technique of repair

There are two recognized methods of repairing torn external anal sphincter (EAS): end-to-end (approximation) method and overlap technique. Traditionally, primary anal sphincter repair involved end-to-end repair of the torn ends of the EAS. Since the publication of a retrospective study that suggested an improved outcome could be achieved by using an overlap technique (Sultan *et al.* 1999), four RCTs have been completed (Fitzpatrick *et al.* 2000; Garcia *et al.* 2005; Fernando *et al.* 2006a; Williams *et al.* 2006).

In each RCT, women were randomized to end-to-end approximation or overlap repair of the EAS. The number of recruited patients varied between 41 and 112, with one study being underpowered (Garcia *et al.* 2005). Patient follow-up assessed anal continence scores and quality of life, together with a mixed combination of ultrasound and anal manometry findings. The duration of follow-up varied from 3 months (Fitzpatrick *et al.* 2000; Garcia *et al.* 2005) to 12 months (Fernando *et al.* 2006a; Williams *et al.* 2006).

There were also differences in the degree of sphincter injury in women recruited across the RCTs. Three studies (Fitzpatrick *et al.* 2000; Garcia *et al.* 2005; Williams *et al.* 2006) included all EAS injuries (3A, 3B and 3C), whereas one (Fernando *et al.* 2006a) only recruited women with disruption greater than 50% (3B and 3C). In the latter study, patients with 3B tears had the remaining EAS fibres divided to perform an overlap technique. This contrasts with the other studies, in which overlap was undertaken without division of EAS fibres.

No significant difference was found between the groups in terms of faecal incontinence rates in three of the RCTs (Fitzpatrick *et al.* 2000; Garcia *et al.* 2005; Williams *et al.* 2006). In the other study (Fernando *et al.* 2006a), an improvement in outcome was seen with overlap repair. In addition to the difference in approach to the overlap technique in 3B tears in this study, there was a potential difference in the experience of the clinicians undertaking the repair. In contrast to the other studies, sphincter injuries were repaired by three trained clinicians, rather than one of a larger number of trained clinicians, as in the other studies. As such, the benefit of an overlap repair shown in this RCT may not be applicable across other obstetric units.

Internal anal sphincter

The original description of the overlap technique includes separate repair of the internal anal sphincter (IAS) (Sultan *et al.* 1999). The IAS has a role in maintaining continence at rest (Sangwan & Solla 1998), and studies have shown increased anal incontinence in women with both IAS and EAS injury compared with EAS injury alone (de Leeuw *et al.* 2001). It has been recognized that identification of the IAS is not always possible in clinical practice; indeed, it was not identified separately from the EAS in all of the RCTs (Williams *et al.* 2006). Whether the IAS

should be repaired separately from the EAS is not clear from current evidence, but if identified, it would seem advisable to repair it separately.

Who should undertake sphincter repair?

Traditionally, anal sphincter injury repair was carried out at the time of injury by trainee obstetricians. It is recognized that inexperienced attempts at anal sphincter repair can contribute to maternal morbidity. As a result, repair would be delayed in some units so that it could be undertaken by colorectal surgeons who were experienced in secondary sphincter repair.

Deficiencies in the training of both obstetricians and their trainees in the repair of sphincter injury have been highlighted (Fernando *et al.* 2002). As a result, many workshops are now available throughout the UK. Attendance at a hands-on training workshop has been shown to increase both awareness of perineal anatomy and recognition of anal sphincter injury (Thakar *et al.* 2001).

The RCOG recommend that sphincter repair is performed by appropriately trained obstetricians.

Outcome of primary anal sphincter injury repair

Studies using endoanal ultrasound (EAUS) and neurophysiological tests have shown that a poor outcome in terms of faecal incontinence symptoms is related to a persistent sphincter defect (Poen *et al.* 1998; Chaliha *et al.* 2001).

Many prospective and retrospective studies have assessed the outcome in these women, with anal incontinence reported in approximately 40% of women (Gjessing *et al.* 1998; Poen *et al.* 1998). Persistent sphincter defects have been reported on EAUS in 54–88%. The incidence of symptoms is much higher when faecal urgency (Sultan *et al.* 1994), anal discomfort, dyspareunia and anal incontinence during sexual intercourse are considered (Gjessing *et al.* 1998).

The RCTs comparing end-to-end approximation with overlap repair have shown that 60–80% of women will be asymptomatic at 12 months after primary repair of obstetric anal sphincter injury (Fernando *et al.* 2006a; Williams *et al.* 2006). Lower rates of persistent defects have also been shown, occurring in 19–36% of women in RCTs.

Based on the evidence from the four published RCTs, patients who have an anal sphincter tear repaired using either end-to-end approximation or overlap technique with a intra- and postoperative protocol similar to that described above can be counselled that the outcome of primary repair is likely to be good and the most common symptom experienced is incontinence to flatus.

In addition to anal incontinence, the longer-term consequences of anorectal injury include perineal pain, dyspareunia and anorectal fistula. Perineal pain can lead to significant morbidity following vaginal delivery. It can interfere with the women's ability to bond with her newborn. If severe, the condition may lead to problems with voiding of urine and defecation. Many studies have reported that perineal pain and dyspareunia affect up to 50% of women after anorectal injury, and the symptoms may persist for many years (Haadem *et al.* 1988; Sultan *et al.* 1994). There is a considerable impact on women's psychosexual health, with many avoiding intercourse for several years.

Abscess formation, wound breakdown and rectovaginal fistula are serious, but fortunately rare, consequences of anorectal injury. It is thought that most rectovaginal fistulae following sphincter repair are caused by failure to recognize the true extent of the initial injury, which leads to wound breakdown (Giebel *et al.* 1993). Wound breakdown rates of 10% have previously been reported after sphincter repair (Venkatesh *et al.* 1989). However, the recent RCTs assessing the method of repair failed to report any cases of wound breakdown. This may be a reflection of the routine use of broad-spectrum antibiotics in protocols for sphincter repair.

Follow-up after obstetric anal sphincter injury

Women should ideally be followed up at 6 weeks postpartum by a consultant with an interest in anorectal injuries (RCOG 2001). The delivery details and the anal sphincter injury should be discussed. Direct and specific questioning about symptoms of faecal incontinence, particularly faecal urgency, and associated symptoms of dyspareunia and perineal pain, should be made. The use of a validated faecal incontinence questionnaire may be helpful and this can be posted to the patient in advance of the appointment.

It is important that women are warned of the possible sequelae of anal sphincter injury. Patients may not be symptomatic at the time of review, but they should be advised on how to obtain advice if symptoms develop at a later date. Undertaking EAUS and manometry, where available, will help with counselling about the mode of delivery in a future pregnancy.

Symptomatic women should be sent to a specialist centre or a colorectal surgeon. Further management of faecal incontinence symptoms will depend on the results of EAUS and manometry. Symptomatic women with a sphincter defect may be offered a secondary sphincter repair. In women without a sphincter defect or with milder symptoms, dietary manipulation to regulate bowel function and advice on avoiding gas-producing foods have been shown to be of benefit. Diarrhoea or incontinence of loose stool is the common distressing symptom. Medications can be used to firm the stool; for example, constipating agents (e.g. loperamide or codeine phosphate) or bulking agents.

The role of the physiotherapist

Many clinicians advocate the involvement of a physiotherapist to teach pelvic floor muscle exercises (PFMEs) in the postpartum management of women with anal sphincter injury. There is no clear guidance from the RCOG regarding this and hospital policies vary widely. The evidence for PFMEs following anal sphincter injury is sparse. One author reported lower anal incontinence rates at one year in women who were taught PFMEs by a physiotherapist following third-degree tear, but the study lacked a control group (Sander *et al.* 1999).

Future pregnancy and mode of delivery

A plan for the management of subsequent pregnancies and the mode of delivery should be part of the follow-up for women who have sustained an anal sphincter injury. There are no Cochrane reviews or RCTs to suggest the best method of delivery following obstetric anal sphincter injury, and as such, opinions differ between clinicians.

There is limited data regarding the likelihood of sphincter injury if vaginal delivery occurs in a subsequent pregnancy. Attempts to develop an antenatal risk scoring system for sphincter injury have been unsuccessful so far (Williams *et al.* 2005b). Studies assessing vaginal delivery following a third-degree tear have shown worsening faecal incontinence symptoms in 17–24% of women (Bek & Laurberg 1992b; Tetzschner *et al.* 1996; Fynes *et al.* 1998; Poen *et al.* 1998). This is particularly true of women who had transient incontinence after the index delivery (Bek & Laurberg 1992b).

Review of all women with a previous anal sphincter injury by a senior clinician at booking is essential. The detail of the previous sphincter injury and the follow-up is important in planning the mode of delivery. An assessment of symptoms of anal incontinence, namely faecal urgency, incontinence of faeces (solid or liquid) and incontinence of flatus, should be made. When obtaining a history, it is important to remember that patients with transient incontinence following a third-degree tear are more likely to have worsening symptoms of faecal incontinence (Bek & Laurberg 1992b). Routine use of one of the validated faecal incontinence questionnaires is useful.

The RCOG guidelines recommend that all women who have sustained an anal sphincter injury in a previous pregnancy should be counselled regarding the risk of developing anal incontinence or worsening symptoms with subsequent vaginal delivery. Women who are symptomatic or who have abnormal EAUS or manometry, should be offered the option of elective CS (Sultan & Thakar 2002). If they are asymptomatic, there is no clear evidence regarding the best mode of delivery.

The patient's own experience of labour or other obstetric-related factors may influence her preference about the mode of delivery. Patients who have had a difficult or traumatic delivery may request elective CS (Williams *et al.* 2005a).

Conclusions

Obstetric anal sphincter injury is the primary cause of faecal incontinence in women. These injuries may be clinically recognized as third- or fourth-degree tears, or may be occult and diagnosed using ultrasound. Repair of injuries recognized at delivery by an experienced operator using a standard protocol, and either end-to-end approximation or overlap techniques of the external sphincter, has been proven to greatly improve the outcome for women by reducing symptoms of faecal incontinence and the persistence of sphincter defects seen on follow-up ultrasound.

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Gillian Fowler is undertaking subspecialty training in urogynaecology at Liverpool Women's Hospital. Her research interests include obstetric anal sphincter injury, which was the subject of her MD thesis.

